The invention claimed is:

1. An optical system for acquiring topography of a surface of an object comprising:

one or more illumination sources emitting patterns of light onto the surface of the object, each of the illumination sources being configured with the same optical perspective;

one or more image sensors which image the surface of the object from one optical perspective which is different from the optical perspective of the illumination sources; and

a processor coupled to the illumination sources and the imaging sensors;

wherein the illumination sources and the imaging sensors are separated along a known direction by a known distance so as to have different perspective views of the surface;

wherein the imaging sensors captures light from the emitted patterns reflected from the surface of the object and converts the captured light into patterned image data;

wherein the emitted patterns of light are coded in such a way such that the processor can identify the path the light traveled from the illumination sources to the surface of the object; and

wherein the processor receives the patterned image data from the imaging sensors and computes the surface topography based upon the patterned image data, the known separation between the illumination sources and the imaging sensors, and knowledge about how the patterns of light are projected from the illumination sources.

2. The system of claim 1, wherein the pattern of light is an array of planes of light which creates a projection of lines on the surface of the object;

wherein the displacement direction between the illumination sources and the imaging sensors is in any direction other than a direction tangent to any portion of the projected lines on the surface; and

wherein the processor is able to measure the distortion of the projected lines on the surface of the object due to viewing them from an optical perspective which is different from the optical perspective of the illumination sources.

3. The system of claim 2, wherein the lines are similar along their length but vary from one to the next in color or composition of different wavelengths;

wherein the imaging sensors are able to detect the different colors or composition of different wavelengths.

4. The system of claim 2, wherein the lines are similar along their length but vary from one to the next in intensity;

wherein the imaging sensors are able to detect the different intensities.

5. The system of claim 2, wherein the lines are similar along their length but vary from one to the next in polarization;

wherein the imaging sensors and processor are able to identify the different polarizations.

6. The system of claim 2, further comprising:

a white light illumination source directed at the colored surface of the object to reflect colored light from the colored surface of the object into the imaging sensors;

wherein the white light illumination source is directed along the same optical perspective as other illumination sources;

wherein the imaging sensors capture a colored image of the white light illuminated colored surface of the object; and

wherein the processor receives the colored image data from the imaging sensors and utilizes the colored image data in mapping the colored image onto the surface topography.

7. The system of claim 2, further comprising:

a white light illumination source directed at the colored surface of the object to reflect colored light from the colored surface of the object into the imaging sensors;

wherein the white light illumination source is directed along the same optical perspective as other illumination sources;

wherein the imaging sensors capture a colored image of the white light illuminated colored surface of the object;

wherein the processor receives the colored image data and utilizes the colored image data to deduce the transmission of colors to each portion of the image; and

wherein the information about transmission of colors is used to alter the intensity and color of portions of the pattern of light projected by the illumination sources in order to improve the quality of information that will be obtained in the subsequent capture of patterned image data.

8. The system of claim 2, wherein each of the lines is uniquely identifiable by some quality, and the transition of that quality from a first value to the last value forms a continuous path which resultantly allows for application of numerical techniques to obtain sub-pixel accuracy in the location of a specific quality on the image sensor.

9. The system of claim 1, further comprising:

capability of the illumination sources to project a rapid succession of different patterns of light; and

multiple image acquisition capability in the imaging sensors selected from group comprising gating of multiple imaging sensors and sequential image captures by one imaging sensor;

wherein a pixel from each image is combined to provide a coding scheme which allows the processor to determine the path taken by the light reaching that pixel.

10. An optical method for acquiring topography of a surface of an object comprising the steps of:

illuminating the surface of the object with patterns of light from illumination sources which projects light from one optical perspective;

capturing patterned light from the illumination sources reflected from the surface of the object with image sensors that have one optical perspective which is different from the optical perspective of the illumination sources;

converting the captured light patterns into patterned image data; and

computing the surface topography based upon the patterned image data, the known separation between the illumination sources and the imaging sensors, and knowledge about how the patterns of light are projected from the illumination sources.

11. The method of claim 10, wherein the pattern of light is an array of planes of light which creates a projection of lines on the surface of the object;

wherein the displacement direction between the illumination sources and the imaging sensors is in any direction other than a direction tangent to any portion of the projected lines on the surface; and

wherein the processor is able to measure the distortion of the projected lines on the surface of the object due to viewing them from an optical perspective which is different from the optical perspective of the illumination sources.

12. The method of claim 11, wherein the lines are similar along their length but vary from one to the next in color or composition of different wavelengths; and

wherein the imaging sensors are able to detect the different colors or composition of different wavelengths.

13. The method of claim 11, wherein the lines are similar along their length but vary from one to the next in intensity; and

wherein the imaging sensors are able to detect the different intensities.

14. The method of claim 11, wherein the lines are similar along their length but vary from one to the next in polarization; and

wherein the imaging sensors and processor are able to identify the different polarizations.

15. The method of claim 11, further comprising the steps of:

illuminating the surface of the object with white light from illumination sources;

capturing reflected colored light from the colored surface of the object;

converting the reflected colored light image to colored light image data; and

computing the colored light data wherein the computing step utilizes the colored light data to map the color image onto the surface topography;

wherein the white light illumination source is directed along the same optical perspective as other illumination sources;

16. The method of claim 11, further comprising steps of:

illuminating the surface of the object with white light from illumination sources;

capturing reflected colored light from the colored surface of the object;

converting the reflected colored light image to colored light image data;

computing the transmission of colors to each pixel of the imaging sensor;

altering the intensity and color of portions of the pattern of light projected by the illumination sources in order to improve the quality of information that will be obtained in the subsequent capture of patterned image data;

illuminating the surface of the object with the altered patterns of light from the illumination sources; and

capturing the image from the reflection of the newly altered patterns of light from the surface of the object;

converting the captured light patterns into patterned image data; and

computing the surface topography based upon the patterned image data, the known separation between the illumination sources and the imaging sensors, and knowledge about how the patterns of light are projected from the illumination sources;

wherein the white light illumination source is directed along the same optical perspective as other illumination sources;

17. The method of claim 11, wherein each of the lines is uniquely identifiable by some quality, and the transition of that quality from a first value to the last value forms a continuous path which resultantly allows for application of numerical techniques to obtain sub-pixel accuracy in the location of a specific quality on the image sensor.

18. The method of claim 10, further comprising the steps of:

capturing a series of images, each of a different pattern of light projected on the surface of the object by illumination sources;

converting the captured light patterns into patterned image data; and

computing the surface topography based upon the combination of patterned image data, the known separation between the illumination sources and the imaging sensors, and knowledge about how the patterns of light are projected from the illumination sources.